2002 VIRGINIA COASTAL RESOURCES MANAGEMENT PROGRAM GRANT

Project Title:
Seaside Heritage Program: SAV Mapping & Restoration **Task #**: 12.03

I. Legal Applicant:

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II. Project Details:

A. **Geographic Area of Impact:** Seaside of Virginia's Eastern Shore
B. **Congressional District(s):** 1

C. **Classification:**
(If Classification is OTHER, please describe):

D. **Start Date:** 1 / 1 / 2003 **End Date:** 12 / 31 / 2003
MM/DD/YYYY MM/DD/YYYY

☒Project is continuing from previous year

III. Project Summary:

(2000 Character Limit)

Seagrasses, primarily eelgrass, *Zostera marina*, were once very abundant in these seaside bays, covering most of the subaqueous bottom. In the 1930's eelgrass underwent a massive decline attributed to a wasting disease pathogen, *Labyrinthula sp*. The decline was pandemic, affecting not only populations in the seaside bays, but also populations on both sides of the Atlantic. In August of 1933, this region was affected by one of the most destructive hurricanes to influence the area in the twentieth century, contributing to the decimation of seagrasses in the bays. Natural recovery of seagrasses has been limited primarily to Chincoteague, Sinepuxent, Isle of Wight and Assawoman bays with little or no recovery in the Virginia seaside bays. This may be due to limited propagule supply and dispersal ability. Today, the Virginia seaside bays are primarily salt marsh and macroalgal dominated.

The goal of Task 12.03 is to continue the restoration of seagrasses in the seaside bays. This project has seven subtasks:

1) Monitor the success of all transplants.

The most critical aspect of this project is to monitor both the established seagrass areas planted since 1998 as well as the small test plots in the Gull Marsh area. This is needed to ensure that conditions are being maintained that are suitable for seagrass growth and that new areas are now suitable for larger scale restoration efforts. Test plots planted at Gull Marsh will be assessed for survivorship at one, six, nine and twelve month intervals. If after 12 months, plants are still present in the test plots, efforts will be targeted to larger scale efforts similar to what has occurred in South Bay and Cobb Bay. Seagrass plots planted between 1998 and 2001 will be monitored with a combination of on-site field checks and also low level remote sensing techniques. Aerial photographs will be taken of previously restored sites, ortho-rectified and given cover percentages based on an objective classification of cover.

2) Develop a methodology for passive collection of seeds

The protocols for collecting seeds require the harvesting of mature flowering shoots with ripe seeds by hand during a three-week window in late May. Divers, using either snorkeling or SCUBA gear, pull flowering shoots from established beds and place them in mesh bags. This method is effective but optimal collection methods do require diving. In recent years we have observed seeds floating at the air-water interface, a result of seeds being released from the plant with a bubble allowing it to float to the surface and then being transported by wind. We observed seeds collecting against source debris suggesting that there may be a way of passively collecting these floating seeds. We found we could actively collect these floating seeds by passing a fine mesh dip net through the water but this process collects seeds from a small area and may not be as effective as harvesting mature shoots with seeds. The goal of this task will be to develop a passive collector that could be deployed at the time that conditions are optimal for seed release (low tide during late morning or early afternoon hours, no clouds and low water turbulence (minimal wind conditions).

3) Collect seeds for restoration work in fall of 2003

Previous work with harvesting seeds has shown that there is generally a 3-4 week window to harvest mature reproductive shoots with ripe seeds, usually from the first week of May to the first of June. Observations have indicated that floating seeds are available for a much briefer period (perhaps a week at most). The major effort will be to continue previous protocols of hand harvesting reproductive shoots with mature seeds when they become available until the time when our observations indicate that the plants have released most of their seeds. Past efforts have usually been completed by June 1. Harvested reproductive shoots are returned to the VIMS laboratory and placed in large seawater holding tanks at the SAV greenhouse. These are monitored for seed release and when completed, seeds are separated from all detritus and plant material and held until the period when seeds are broadcast. Our goal for seed collection efforts in 2003 will be 10 million seeds (previous efforts in 2001 and 2002 yielded 6.6 and 2.4 million seeds.

Respectively) but the final number will be a function of water and air conditions during the seed collection period.

4) Collect water quality data

Previous developmental work in several Chesapeake Bay tributaries has allowed us to map water quality over large, shallow water areas using Dataflow techniques. Discreet measurements are taken at 2-3 second intervals as water is passed through a flow-through measuring chamber while the vessel is traversing the study area. Concurrent with the sensor measurements (including turbidity, chlorophyll fluorescence, temperature, salinity, pH, dissolved oxygen), GPS and depth information are recorded. This information is then analyzed using GIS techniques. Data layers of water quality constituents can be quantified and displayed for the vessel path or interpolated for the entire study area. Fixed stations using similar sensor arrays are deployed for two-week or longer intervals so that this high frequency spatial record can be integrated with the high frequency temporal record for the region. Preliminary runs in this region using Dataflow in the late summer of 2002 have demonstrated marked changes in water quality across the South Bay restoration area. During 2003 the goal for this task will be to conduct Dataflow cruises at monthly intervals throughout the SAV growing season and to deploy the fixed stations for a minimum of 14-day intervals bi-monthly throughout this same period.

5) Restore large areas of seagrass

VIMS will broadcast seeds to a minimum of 30, one-acre plots. A minimum of 20 plots will be placed in the VIMS 400 acre set aside area in South Bay west of Wreck Island, with the additional ten being placed in Cobb Bay and around Gull Marsh, if the test plots survive the required one year. Additional plots will be added if adequate numbers of seeds are harvested in the spring of 2003. Two seed densities will be used: 50,000 seeds (12.5 seeds per square meter) and 100,000 seeds (25 seeds per square meter). Seeds will be broadcast in October, approximately one month before seeds germinate naturally.

6) Establish test plots

While there has been notable success with seagrass transplants in South Bay since 1998, and most recently seed plots in the south end of Cobb Bay, we plan to expand the efforts of seagrass restoration to more northern sections of the seaside bays. However, transplant protocols call for small test plots to be placed at sites where no plantings have been conducted previously to ascertain suitable growing conditions before larger scale efforts are initiated. VIMS placed small (4 square meters) test plots of both adult plants and seeds at four separate locations around Gull Marsh in the autumn of 2002 (FY 2001 Task 7). This was to ascertain whether conditions in this region are suitable for seagrass growth in preparation for potentially adding larger plots here in the fall of 2003. In the fall of 2003, we plan to place test plots in Hog Island Bay, north of Gull Marsh. Placement of adult and seed plots will follow protocols used in VIMS' previous work.

7) Develop a photomosaic

Scanned aerial photographs of the seaside bays taken during 2002 will be geo-rectified and orthographically corrected to produce a seamless series of aerial mosaics following the standard operating procedures used by the annual SAV monitoring program. ERDAS

Orthobase image processing software will be used to orthographically correct the individual flight lines using a bundle block solution. Camera lens calibration data will be matched to the image location of fiducial points to define the interior camera model. Control points from USGS DOQQ images will provide the exterior control, which is enhanced by a large number of image-matching tie points produced automatically by the software. The exterior and interior models are combined with a 30-meter resolution digital elevation model (DEM) from the USGS National Elevation Dataset (NED) to produce an orthophoto for each aerial photograph. The orthophotographs that cover each USGS 7.5 minute quadrangle area are then adjusted to approximately uniform brightness and contrast and will be mosaiced together using the ERDAS Imagine mosaic tool to produce a one-meter resolution quad-sized mosaic. The photomosaics will be an invaluable tool for mapping not only the extent of the seagrasses as they begin to spread, but will also allow us to map other key habitats such as intertidal flats for waterfowl use and potentially avoiding aquaculture conflicts.

IV. Project Budget:

	Federal	Match	Total	Budget Narrative
Personnel	$46,617	$5,318	**$51,935**	
				(May use Personnel worksheet at bottom of page)
Fringe	$10,535	$1,595	**$12,130**	Current rate is established at approximately 30% of salaries. A breakdown by component is on file.
Equipment *(≥$5000)*			**0**	
Travel	$3,500		**$3,500**	Field Work
Supplies *(<$5000)*	$4,000		**$4,000**	Field Supplies, vessel fuel
Contractual			**0**	
Construction				
Other	$4,185		**$4,185**	VIMS Publications Center - $250, Vessels - $2,500, Tuition - $1,435
Total Direct	**$68,837**	**$6,913**	**$75,750**	
Indirect	$16,163	$18,031	**$34,194**	Allowable indirect cost rate is 25%, however VIMS approved rate is 47.78%, VIMS will contribute remaining IDC has match
TOTAL	**$85,000**	**$24,944**	**$109,944**	

Personnel Worksheet

Personnel	Months	Federal	Match	Cost
Kenneth Moore	.75	$3,500.00	$2,659.00	**$6,159.00**
Robert Orth	.25		$2,659.00	**$2,659.00**
Scott Marion	4	$11,598.00		**$11,598.00**
David Combs	4	$9,800.00		**$9,800.00**
Britt Anderson	2.5	$6,527.00		**$6,527.00**
Betty Neikirk	.5	$1,525.00		**$1,525.00**
Student	4	$5,167.00		**$5,167.00**
Hourly		$8,500.00		**$8,500.00**
TOTAL	16	**$46,617**	**$5,318**	**$51,935**

✓*This personnel worksheet may be used to replace or to substantiate the Personnel Budget Narrative, but is not required provided the narrative section is used. (If you use this table,* ***be certain that totals in this table match personnel totals in Budget Table!****)*

V. Deliverables/Products:

✓*Description of products should include the manner of achieving results as well as a description of the outcome. (2000 Character Limit on Product Descriptions).*

Product #1:

Title: Semi-Annual Report

Description: The VIMS Project Coordinator will submit progress reports outlining the status of the project up to that date. These reports will be due April 15, 2003, October 15, 2003 and January 15, 2004.

Product/Outcome Timeframe: Start: January 2003
End: December 2003

Product #2:

Title: Final Report

Description: VIMS will produce a final report outlining work completed for each of the 7 tasks in the proposal. The report will include photographs of the planted areas and test plots as well as data on survivorship and water quality. Coastal Program staff will develop acknowledgement interpretive signage on the seaside restoration efforts and Seaside Heritage Program to be posted at the Oyster and Wachapreague boat ramps under the auspices of FY 2002 Task 12.

Product/Outcome Timeframe: Start: January 2003
End: December 2003